I CLAIM:

1. A latching hinge method of making an electronically controlled MEMS device comprising the steps of:

fabricating electronic control circuit module and MEMS active element module portions of said MEMS device on first permanent and second sacrificial substrate members respectively;

said second sacrificial substrate MEMS active element module fabrication including also multiple substrate layers-resident sacrificial supplementary components comprised of a substrate hinge mounted etch plate, etch plate to MEMS active element module connection tethers, a substrate coupled etch plate latch assembly and an etch plate to sacrificial substrate anchor assembly;

releasing said MEMS active element module and selected of said sacrificial supplementary components from fabrication-related confinement in said substrate multiple layers into movable, partially attached to one of said sacrificial substrate and to other of said supplementary components, states;

release of said substrate hinge mounted etch plate and tether coupled MEMS active element module combination from a temporary confinement by said anchor assembly into a substrate hinge-enabled pivotal condition being a final of said releasing events;

rotating said released hinge mounted etch plate and tether coupled MEMS active element module combination at said hinge into a selected off of sacrificial substrate position by applying external forces to said etch plate and tethered MEMS active element module combination;

latching said etch plate and tethered MEMS active element module combination into said selected off MEMS substrate rotated position by coupling extendable portions of said etch plate latch assembly with said etch plate using external latch assembly-received forces;

moving said MEMS active element module, said tether-attached etch plate, and said hinge attached MEMS active element sacrificial substrate combination into a position of selectably aligned MEMS active element module engagement with said electronic control circuit module; and

engaging said MEMS active element module and said electronic control circuit module into an aligned, device housing-surrounded electronically controlled MEMS device;
discarding said tethers, said etch plate, said etch plate latch assembly, said etch plate to substrate anchor assembly and said sacrificial second substrate.

2. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said MEMS device includes a micromirror active element.

3. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said electronic control circuit module includes CMOS electronic circuits.

4. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said electronic control circuit module and said first permanent substrate member are comprised of different semiconductor materials with respect to said MEMS active element module and said second sacrificial substrate member.

5. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said step of releasing said MEMS active element module and selected of said sacrificial supplementary components from fabrication confinement in said multiple layers includes etching away a reagent-responsive layer of substrate coating material.

6. The latching hinge method of making an electronically controlled MEMS device of claim 5 wherein said reagent-responsive layer of substrate coating material is an oxide layer.

7. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein:

said release of said etch plate from temporary confinement by said anchor assembly includes a chemical reactant free physical change in said anchor assembly.

8. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said step of engaging said MEMS active element module and said electronic control circuit module into an aligned, device housing-surrounded electronically controlled MEMS device includes a MEMS device package sealing event.

9. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said rotating step selected off of sacrificial substrate position is a position of one hundred eighty degrees rotation with respect to an upper surface of said sacrificial substrate.

10. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said step of latching said etch plate and tethered MEMS active element module combination into said selected off MEMS substrate rotated position includes moving portions of said substrate coupled etch plate latch assembly with a tip portion of a portable wafer probe element.

11. The latching hinge method of making an electronically controlled MEMS device of claim 1 wherein said multiple layers resident sacrificial supplementary components further include a plurality of physically stressed lifting beams engaging with said substrate hinge-mounted etch plate and performing an initial separation of said etch plate from said sacrificial substrate.

12. Locking hinge positioning apparatus for a MEMS device fabrication inclusive of a substrate removed MEMS module, said apparatus comprising the combination of:

a temporary MEMS module release plate member comprised of semiconductor substrate overlay materials included in said MEMS module;

said temporary MEMS module release plate member having physical dimensions at least equal to those of said MEMS module and including pivoting hinge portions anchored in

said semiconductor substrate in a location closer to an edge boundary of said substrate than one of said physical dimensions;

a temporary MEMS module release plate member latching assembly comprised of semiconductor substrate overlay materials included in said MEMS module;

said temporary MEMS module release plate member latching assembly having an end portion slidably captured adjacent said semiconductor substrate and a movable elements extendable opposed end portion engageable with a mating portion of said temporary MEMS module release plate member during a selected hinge-rotated, off substrate MEMS module bonding positioning of said temporary MEMS module release plate member; and

a plurality of elongated tether members comprised of semiconductor substrate overlay materials included in said MEMS module and connecting at one end thereof with said MEMS module and at an opposed end thereof with said temporary MEMS module release plate member.

13. The locking hinge positioning apparatus of claim 12 wherein said MEMS device is comprised of said MEMS module and an electronic circuit module disposed in permanent electromagnetic field-coupled proximity in said MEMS device.

14. The locking hinge positioning apparatus of claim 12 wherein said semiconductor substrate overlay materials included in said MEMS module comprise polysilicon materials.

15. The locking hinge positioning apparatus of claim 14 wherein said temporary MEMS module carrier member pivoting hinge portions include a polysilicon hinge pin element surrounded by a plurality of movable polysilicon hinge staple portions.

16. The locking hinge positioning apparatus of claim 12 wherein said elongated tether members have a length dimension compatible with a feasible proximity distance between said off module position of said temporary MEMS module carrier member and said electronic circuit module during a MEMS module assembly step.

17. The locking hinge positioning apparatus of claim 12 wherein said MEMS module release plate member latching assembly having an end portion slidably captured adjacent said semiconductor substrate is captured by a plurality of sliding engagement guide rail members anchored on said substrate member.

18. The locking hinge positioning apparatus of claim 17 wherein said sliding engagement guide rail members are comprised of polysilicon material.

19. The locking hinge positioning apparatus of claim 17 wherein said temporary MEMS module release plate member latching assembly and said temporary MEMS module release plate member include dimensions and substrate dispositions enabling their mutual engagement in a release plate location hinge rotated and latched at a location one hundred eighty degrees from adjacency with said substrate member.

20. The locking hinge positioning apparatus of claim 14 wherein said semiconductor substrate overlay materials included in said MEMS module comprise first and second

superimposed polysilicon material layers each having initial oxide layer coatings received thereon.

21. MEMS latching apparatus for electively connecting a fixed first MEMS element with an adjacently disposed movable second MEMS element, said latching apparatus comprising the combination of:

a silicon semiconductor substrate member portion of said first MEMS element, said substrate having a first oxide covered polysilicon layer received thereon and a second oxide covered polysilicon layer received over said first oxide covered polysilicon layer;

an elongated slide member derived from said first polysilicon layer of said silicon semiconductor substrate member;

a slider head member connected with said elongated slide member, derived from attached portions of said first polysilicon layer and said second polysilicon layer and held in guided sliding captivity with respect to said silicon semiconductor substrate member;

a sliding cap member derived from said second polysilicon layer and movable over a selectable portion of said elongated slide member;

said sliding cap member including a cross sectional portion received in extended captivity with respect to said silicon semiconductor substrate member along said elongated slide member;

said sliding cap member including a receptacle portion engageable with a tongue portion of said adjacently disposed second MEMS element in one sliding position thereof along said elongated slide member; and

said elongated slide member and said sliding cap member being each movable with respect to said silicon semiconductor substrate member and with respect to said second MEMS element in response to application of external movement forces.

22. The MEMS latching apparatus of claim 21 wherein said first MEMS element and said adjacently disposed movable second MEMS element comprise portions of an electromechanical MEMS module.

23. The MEMS latching apparatus of claim 22 wherein said movable second MEMS element comprises a hinge-pivoted header member portion of said electromechanical MEMS module.

24. The MEMS latching apparatus of claim 21 wherein said first MEMS element and said adjacently disposed movable second MEMS element comprise first and second electrical contact pad portions of a MEMS module and wherein said apparatus includes a plurality of said MEMS latching apparatuses.

25. The MEMS latching apparatus of claim 21 wherein said first polysilicon layer and said second polysilicon layer each include oxide covering layers and wherein a portion of said first polysilicon layer oxide covering layer remains trapped intermediate slider head portions of said first polysilicon layer and said second polysilicon layer as a stiffening increasing element.

26. The MEMS latching apparatus of claim 21 wherein said elongated slide member derived from said first polysilicon layer is released from said substrate member into a movable condition by an etch removed fabrication-sequence oxide layer of selected thickness.

27. The MEMS latching apparatus of claim 21 wherein said apparatus includes first and second stop elements connected with said silicon semiconductor substrate member and limiting sliding movement of said slider head member in response to said application of external movement forces.

28. The MEMS latching apparatus of claim 21 wherein said slider head member guided sliding captivity and said sliding cap member extended captivity each include second polysilicon layer derived guide rail elements connected with said silicon semiconductor substrate member.

29. The MEMS latching apparatus of claim 21 wherein said slider head member includes a recess region disposed to receive said external movement forces and said external movement forces are applied through a portable probe tip member to said recess region.

30. The MEMS latching apparatus of claim 21 wherein said sliding cap member includes a clearance space with respect to said elongated slide member and wherein said clearance space is defined by removed portions of said first polysilicon layer oxide covering layer.

31. MEMS latching apparatus for electively connecting a first MEMS element with an adjacently disposed movable second MEMS element, said latching apparatus comprising the combination of:

a substrate member portion of said first MEMS element, said substrate having a layer of first structural material received thereon and a layer of second structural material received over said first structural material layer;

an elongated slide member derived from said layer of first structural material;

a slider head portion connected with said elongated slide member, derived from coupled portions of said layer of first structural material and said layer of second structural material and held in guided sliding captivity with respect to said substrate member;

a sliding cap member derived from said layer of second structural material and movable over a selectable portion of said elongated slide member; [dependent claim: displaceable from initial position, guide rails, having an initial coplanar relationship with, removed oxide layer, said sliding cap member including a cross sectional portion received in extended captivity with respect to said substrate member along said elongated slide member;

said sliding cap member including a receptacle portion engageable with a tongue portion of said adjacently disposed second MEMS element in one sliding position thereof along said elongated slide member; and

said elongated slide member and said sliding cap member being each movable with respect to said substrate member and with respect to said second MEMS element in response to application of external movement forces.

32. MEMS latching hinge apparatus comprising the combination of:

a MEMS active element module having a electromagnetic field responsive active element received in an exposed location thereof, said module comprising a plurality of active layers overlying a sacrificial substrate member;

a MEMS active element module protection member also residing in said plurality of active layers overlying said sacrificial substrate member in a location laterally displaced from said MEMS active element module, said MEMS active element module protection member exceeding said MEMS active element module in lateral extents;

said MEMS active element module protection member including a plurality of module edge received hinge elements connecting said protection member with said sacrificial substrate member;

said MEMS active element module protection member further including an electively releasable anchor apparatus connected with said substrate member and holding portions of said module in close proximity with said substrate member until electively released;

a plurality of flexible tether members also residing in said plurality of active layers overlying said sacrificial substrate member and extending between said MEMS active element module and said MEMS active element module protection member;

a MEMS active element module protection member latching assembly additionally residing in said plurality of active layers overlying said sacrificial substrate member in a selected lateral distance separation from said MEMS active element module protection member, said latching assembly including a lengthwise movable MEMS active element module protection member stabilization arm having an end portion connectable with a protrusion from said MEMS active element module protection member following a hinge rotation enabled off-chip positioning of said MEMS active element module protection member and said MEMS active element module; and

tensioned lifting beam apparatus disposed in said active layers adjacent said MEMS active element module protection member and engageable with said MEMS active element module protection member to perform initial separating of said MEMS active element module protection member from said substrate upon release of said MEMS active element module protection member from said anchor element.

33. The MEMS latching hinge apparatus of claim 32 wherein said MEMS active element module protection member exceeds said MEMS active element module in lateral extents.

34. The MEMS latching hinge apparatus of claim 32 wherein said MEMS active element module electromagnetic field responsive active element comprises a micromirror element.

35. The MEMS latching hinge apparatus of claim 32 wherein said MEMS active element module protection member latching assembly is comprised of two layers of structural semiconductor material disposed in removed intermediate oxide layer-achieved physical segregation.

36. The MEMS latching hinge apparatus of claim 35 wherein said MEMS active element module protection member latching assembly is comprised of two layers of structural semiconductor material disposed in a cross sectional pattern having first layer portions separated from overlying second layer portions by a sliding separation gap in one location thereof and said same first layer portions coupled to overlying second layer portions in another location thereof.